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(71) Applicant: **BRITAX CHILD-CARE PRODUCTS PTY. LTD.**
99 Derby Road
Sunshine 3020 Victoria (AU)

(72) Inventor: **Lumley, Michael Andrew**
99 Derby Road
Sunshine, Victoria (AU)

(74) Representative: **Hollinghurst, Antony**
B.S.G. International plc
Patent Department
Castle Trading Estate
East Street
Portchester, Hants PO16 9SD (GB)

(54) A harness arrangement.

(57) This invention relates to a harness arrangement for use with a seat, and in particular to a seat strap assembly and a means of adjusting the straps. The seat strap assembly (10) comprises a pair of straps (12, 13) that are each secured at their first end to the seat (14) at a first position with respect to the seat (14) so that they are secured to the seat (14) adjacent the shoulders of an occupant. The straps (12, 13) extend to and through apertures (24, 26) in second positions of the seat (14) that are adjacent to and either side of the waist of the occupant. Coupling means (15) are located on each of the straps (12, 13) and connect together so that we they are positioned over the occupant and connected together the two straps (12, 13) extending between the said first ends and said coupling means (15) comprise shoulder straps (13), and portions of the two straps (12, 13) that extend between the coupling and said apertures comprise lap straps (12). An adjustment strap (28) is secured to the second end of each strap (12, 13) and locking means (29) on the seat (14) is provided for releasably securing the adjustment strap (28) so that the shoulder and lap straps (13, 12) may be loosened or tightened by changing the position of the adjustment strap (28) with respect to the locking means (29).

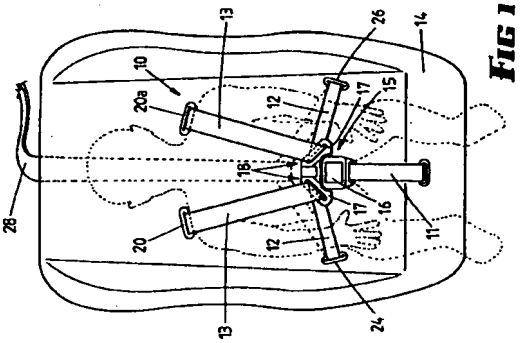

FIG 1

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This invention relates to a harness arrangement for use with a seat, and in particular to a seat strap assembly and a means of adjusting the straps.

The invention will find many applications, but primarily has been designed for use with respect to moulded infant seats which can be located within motor vehicles.

The use of such safety seats have become very widespread, and now in fact are required by law for infants of certain age ranges. Such safety seats normally comprise some form of harness or seat strap assembly which secures the infant to the seat. Harnesses generally comprise shoulder or sash straps, lap straps and a crutch strap. The strap portions are attached to a coupling means such as a conventional buckle which enables the harness to be assembled around and over an infant.

In order to ensure that the infant is safely restrained within the seat, the harness must be properly adjusted, and it is generally an aim of such safety seats to ensure that the harness adjustment is as simple as possible. An example of such harness adjustment means is shown in Australian Patent No 503602 which allows the adjustment of the harness to be effected through a single pull strap. The arrangement shown in this patent specification works well, and has been used extensively.

However, the applicants have investigated alternative configurations, which provide the same ease of adjustment, and which also provide other advantages in relation to the load distribution to the various members associated with the harness.

In its broadest form the invention comprises a seat strap assembly having;

a pair of straps that are each secured at their first ends to said seat at respective attachment positions adjacent the shoulders of an occupant, said straps having second ends extending to and through apertures in said seat at positions that are adjacent to and either side of the waist of said occupant,

mutually interconnectable coupling means on each one of said straps, positioned so that they overlie said occupant when they connect together, resulting in the portions of the two straps extending between said first ends and said coupling means comprising shoulder straps, and the portions of the two straps extending between said coupling and said apertures comprising lap straps,

an adjustment strap secured to the second end of each said strap, and

locking means on said seat for releasably securing said adjustment strap so that said shoulder and lap straps may be loosened or tightened by changing the position of the adjustment strap with respect to said locking means.

The invention may also comprise a seat strap arrangement having,

a crutch strap secured at one end to a seat with the first half of a coupling comprising a female member attached to the other end of the crutch strap,

a pair of straps, each secured at their first end to said seat at respective attachment positions adjacent the shoulders of an occupant, said straps having second ends extending to and through apertures in said seat that are adjacent and either side of the waist of said occupant,

a second half of said coupling comprising two separate male members each having belt engaging apertures so that one of each said male member is attached to one of said straps to form shoulder portion between said first end of said strap portion and said male member of said coupling, and lap portions which extend between said male member of said coupling and said aperture through said seat,

an adjustment strap secured to the second end of each of said straps, and

a locking means on said seat releasably securing said adjustment strap so that said shoulder and lap straps may be loosened or tightened by changing the position of the adjustment strap with respect to said locking means.

Preferably, in both aspects of the invention the straps forming the lap and shoulder straps comprise a single length of strap, with the first ends of the strap secured to the seat such that the centre portion of the strap extends behind the seat.

The coupling means may comprise any number of securement devices such as buckles or similar releasable connections, but preferably a two way or three way buckle is used. In the second aspect of the invention, a female member is secured to the crutch strap, with a pair of male members, each having a belt receiving aperture, being releasably engageable with the female member. Such buckle arrangements ensure easy location of the infant within the harness and as the coupling is engaged, a pair of lap and shoulder straps are located either side of the infant.

Numerous securing means may be used to attach the first end of the strap portions to the seat, but preferably a pair of three bar buckles may be used which bear against a surface of the seat with the belt passing through an aperture. The seat may be provided with a number of apertures which are spaced with respect to the lap strap apertures to allow adjustment of the shoulder position for infants of various sizes.

The crutch strap may also be secured using a three bar buckle, and the crutch strap may or may not be adjustable in length.

Preferably, the adjustment strap comprises a single strap which is secured to the strap portion as it extends behind the seat between the lap strap apertures. In the case of an infant seat where the infant's position is in a rearward facing position with respect to the vehicle, the releasable locking means is located at the head end of the seat where it is most accessible. Preferably, the locking means enables the adjust-

ment strap to be pulled through in one direction, but prevents movement of the adjustment strap in the opposite direction. Clearly, with the seat strap arrangement as described, in impact circumstances, the adjustment strap would be placed under tension.

By pulling the adjustment strap, the strap portion that extends behind the seat is pulled, which in turn pulls both the lap and shoulder straps. As the adjustment strap is held centrally with respect to the seat, then the shoulder and lap straps either side of the infant are pulled evenly.

In a further aspect of this invention, the straps can be arranged to ensure that excessive loads are not applied to the releasable locking means. In the case of a small infant, with the harness fully adjusted, the portion of the strap which extends behind the seat from the lap strap apertures is reasonably lengthy, and therefore an acute angle may be formed between the straps which are located either side of the adjustment strap connection point. This means that any load applied during collision conditions will be applied more directly to the locking means. In the case of small infants, this is not unsafe.

However, in the case of infants of a larger size, such loading may be undesirable. However, as the infant is of a larger size with the strap portions secured in a higher shoulder position, the effective length of the strap portion is reduced such that the strap extending behind the seat is also shorter resulting in an obtuse angle between the straps either side of the attachment point of the adjustment strap. The sum of the force vectors in this circumstance result in more force being applied to the seat without a significant increase in the force being applied to the locking means.

In order for the invention to be more fully understood, a preferred embodiment will now be described, but it should be realised that the invention is not to be restricted to the precise details of this embodiment.

The embodiment is illustrated in the accompanying figures in which:

Fig 1 shows a top plan view of a safety seat with an installed harness and

Fig 2 shows a rear plan view of a safety seat with the harness installed.

As seen in Fig 1, the harness 10 comprises a crutch strap 11, a pair of lap straps 12 and a pair of shoulder straps 13. The coupling 15 comprises a three way buckle having a female member 16 and a pair of male members 17. Each of the male members 17 is provided with an aperture for slidably locating a strap therethrough.

In accordance with this embodiment, the lap and shoulder straps 12 and 13 comprise a single strap which are secured to the seat 14 at a position adjacent the shoulders of the occupant. In this embodiment, there are provided a number of apertures 20 that are positioned either side of the centre line of the seat 14.

As seen in Fig 2, the end of the harness strap 21 is attached to a three bar buckle 22, the aperture 20 being sized such that the three bar buckle cannot pass therethrough, and is held against the rear surface of the seat 14. The strap is fed through the aperture 18 on the first male member 17, and then exits the seat via aperture 24. The centre portion 25 of the strap extends across the rear of the seat 14, the centre portion 25 extending between two apertures 24 and 26. The strap then is located through an aperture 18 of the second male portion 17, whereupon the end of the strap is secured to the seat by passing through an aperture 20a and having an end 21a secured to a three bar buckle 22a.

As seen in Fig 2, an adjustment strap 28 is secured to the centre portion 25 and passes through a releasable locking means 29. The releasable locking means 29 has a mechanism which allows the adjusting strap 28 to be pulled through it and away from the seat 14, but when tension is placed on the adjustment strap 28 between the adjustable locking means and the centre portion 25, the adjustable locking means 29 restrains any movement of the adjustment strap 28.

As seen in Fig 2, there are provided a number of apertures 20, 20a, 20b and 20c to which the ends 21 of the strap can be secured. The apertures 20 and 20a and apertures 20b and 20c are positioned to accommodate infants of various sizes, to ensure that there is minimal movement of the infant within the seat before abutment of the shoulders against the shoulder straps 13. In the case of a smaller infant, the centre portion 25 will be much larger as shown by the dashed outline 25a in Fig 2, which will result in a relatively small angle between the portions of the strap either side of the adjustment straps 28 attachment point. This configuration will result in loads being applied more directly to the releasable locking means 29.

In the case of a larger child as is shown in Figs 1 and 2, the centre portion 25 will be much shorter, and accordingly the angle between the strap either side of the adjustment straps 28 connection point will be obtuse. This results in a smaller component of force being applied to the releasable locking means 29 with more of the force being absorbed by the seat 14.

Finally, the crutch strap 11 is secured to the seat 14 via a three bar buckle 30 and the length of the crutch strap 11 may or may not be extendable.

In operation, the coupling means 15 is released which therefore allows the child to be placed in the seat 14. The crutch strap is brought into position in front of the child, and both pairs of lap and shoulder straps 12 and 13 are positioned over the child so that the male members 17 can engage the female members 16. In order to adjust the tension of both the lap and shoulder straps 12 and 13, the adjustment strap 28 is pulled at its end which results in the centre por-

tion 25 being pulled which again causes both the lap and shoulder straps 12 and 13 to be shortened and be tightened. Therefore, a simple adjustment of the harness 10 can be obtained by one action.

As will be seen from the above description, the invention provides a convenient arrangement of the harness which allows easy use and adjustment. In addition, this arrangement has a feature of reducing the load applied to the releasable locking means 29 as the size of the child increases.

Claims

1. A seat strap assembly (10) comprising a pair of straps (12, 13), that are each secured at their first ends to said seat (14), said straps (12, 13) having second ends extending to and through apertures (24, 26) in said seat (14),

   mutually interconnectable coupling means (15) on each one of said straps (12, 13) positioned so that they overlie said occupant when they connect together,

   an adjustment strap (28) secured to the second end of each said strap (12, 13), and

   locking means (29) on said seat (14) for releasably securing said adjustment strap (28) so that said shoulder and lap straps (13, 12) may be loosened or tightened by changing the position of the adjustment strap (28) with respect to said locking means (29),

   characterised in that the first ends of the straps (12, 13) are secured to the seat at respective attachment positions (20, 20a) adjacent the shoulders of an occupant, and said apertures (24, 26) in said seat (14) are adjacent to and either side of the waist of said occupant, whereby the portions of the two straps (12, 13) extending between said first ends and said coupling means (15) comprise shoulder straps (13), and the portions of the two straps extending between said coupling and said apertures (24, 26) comprise lap straps (12).

2. A seat strap assembly according to claim 1 further comprising a crutch strap (11) secured at one end to said seat (14), the other end securable to said coupling means (15).

3. A seat strap assembly according to claim 2 wherein said coupling means (15) comprises a three way buckle where the female member (16) of said buckle is secured to the end of said crutch strap (11), and the two male members (17) attached to one each of said straps (12, 13).

4. A seat strap assembly according to claim 3 wherein each of the male members (17) of said buckle have belt receiving apertures for engagement on each of said belts (12, 13).

5. A seat strap assembly according to any one of the preceding claims wherein said second ends of said straps (12, 13) are connected.

6. A seat strap assembly according to claim 5 wherein said shoulder and lap straps (13, 12) are all formed from a single strap that is secured at each end to said first positions with the centre portion of said single strap extending between said apertures (24, 26) behind said seat.

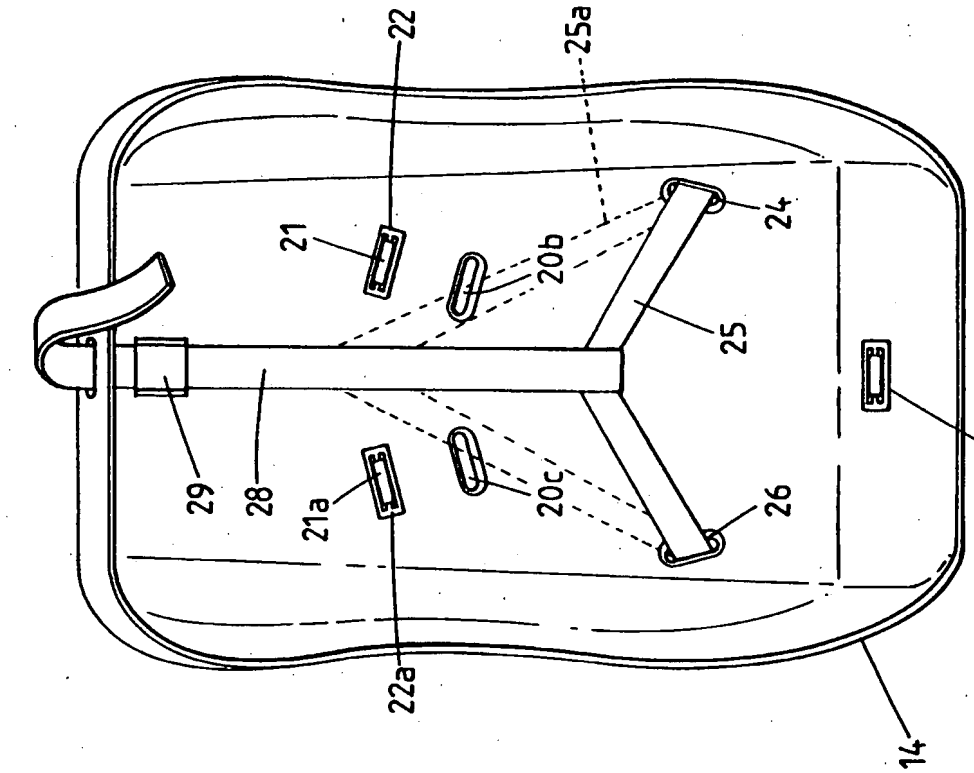
7. A seat strap assembly according to any one of the preceding claims wherein said adjustment strap (28) comprises a single strap extending substantially along the vertical centre line of said seat (14).

8. A seat strap assembly according to claim 7 wherein the angle formed between said second ends of said strap (12, 13) either side of the connection point of said adjustment strap (28) increases as the size of the occupant increases, thereby resulting in less load being applied to said adjustment strap (28) when load is applied to said shoulder and lap straps (13, 12) by forward movement of the occupant.

9. A seat strap assembly according to any one of the preceding claims wherein said locking means (29) comprises a cam acting lock that allows said adjustment strap (28) to be pulled freely through it to tighten said shoulder and lap straps (13, 12), and automatically locks against said adjustment strap (28) to prevent movement in the opposite direction.

10. A seat strap assembly according to any one of the preceding claims wherein said locking means (29) is located at the head end of said seat (14) on its rear surface.

11. A seat strap assembly according to any one of the preceding claims wherein said shoulder straps (13) and crutch strap (11) are secured to said seat (14) by three-bar buckles (22, 22a) attached at the end of said straps (13), the straps locating through apertures (20, 20a) with said three-bar slides (22, 22a) abutting against said seat (14) thereby holding said straps (13) with respect to said seat (14).


22
25a
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20b
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21a
20c
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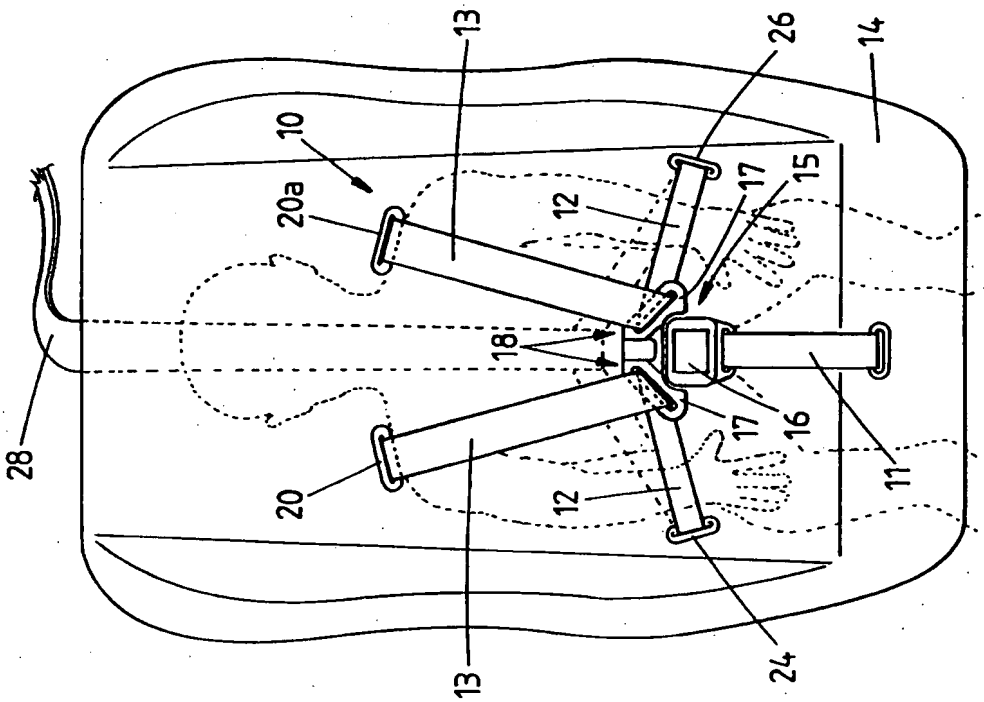
22a
14

FIG 2


13
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20a
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FIG 1

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 94 30 7696

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A	US-A-4 429 916 (R. E. HYDE ET AL.) * column 6, line 57 - column 7, line 68; figures 1-4 *	1	B60R22/10
A	US-A-4 660 889 (J. R. ANTHONY AND A. R. LORTZ) * column 4, line 59 - column 5, line 35; figure 8 *	1	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

B60R
B60N

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	30 January 1995	Chlosta, P

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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